Invention: PROJECTION SYSTEM
Applicant: Li, et al.
Filed: July 29, 2003 Attorney Kevin L. Russell, Reg. No. 38,292
Docket 7146.0163 Telephone (503) 227-5631

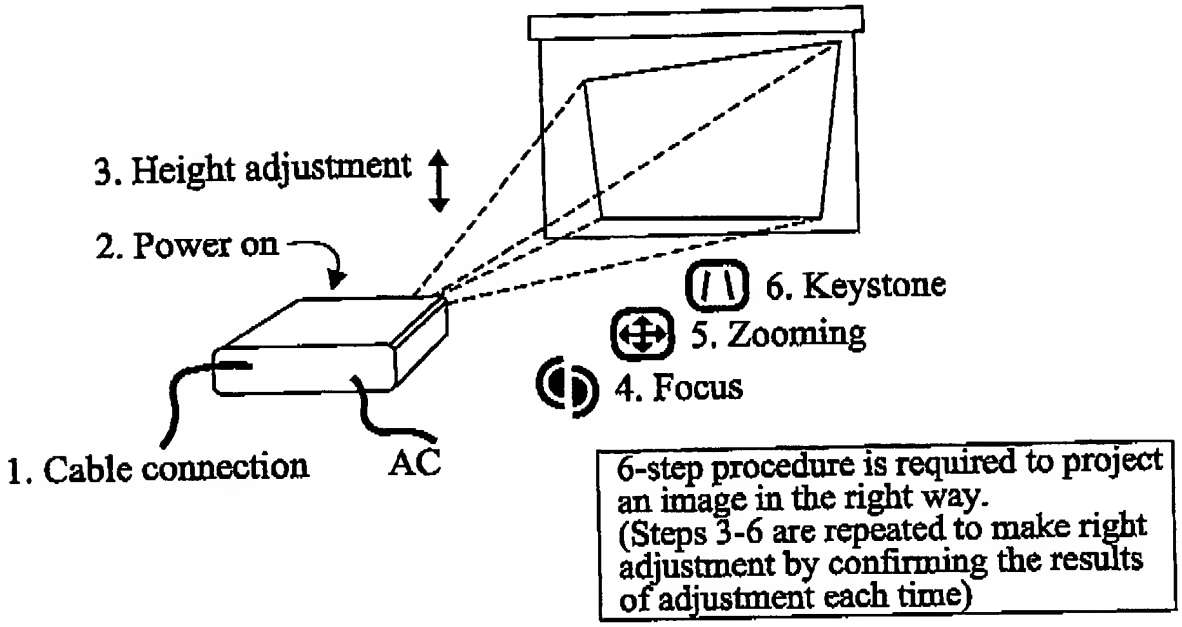


FIG. 1

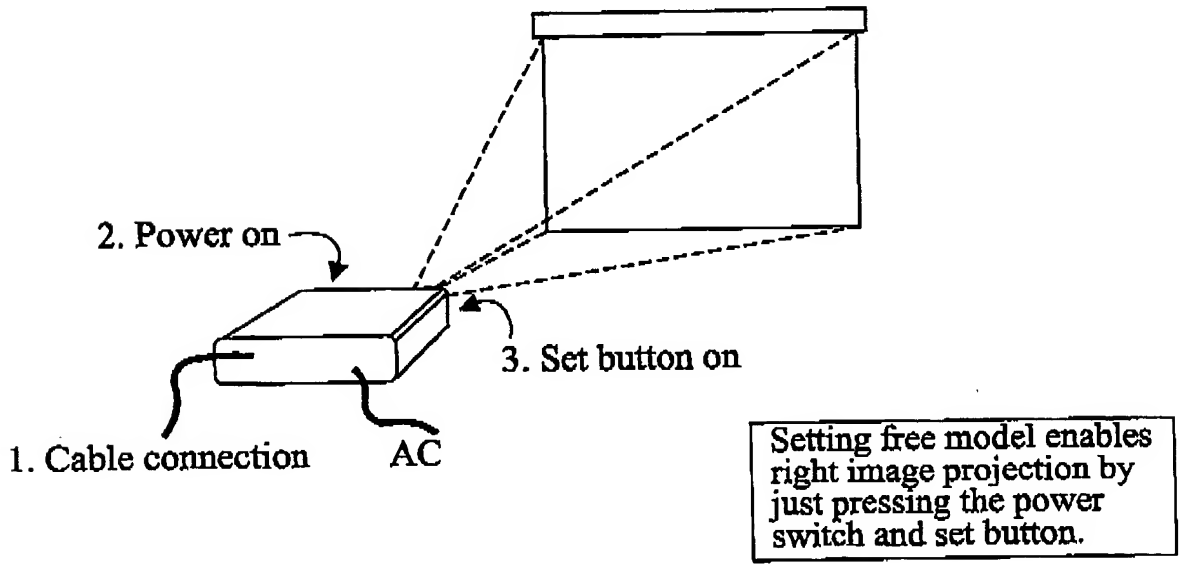


FIG. 2

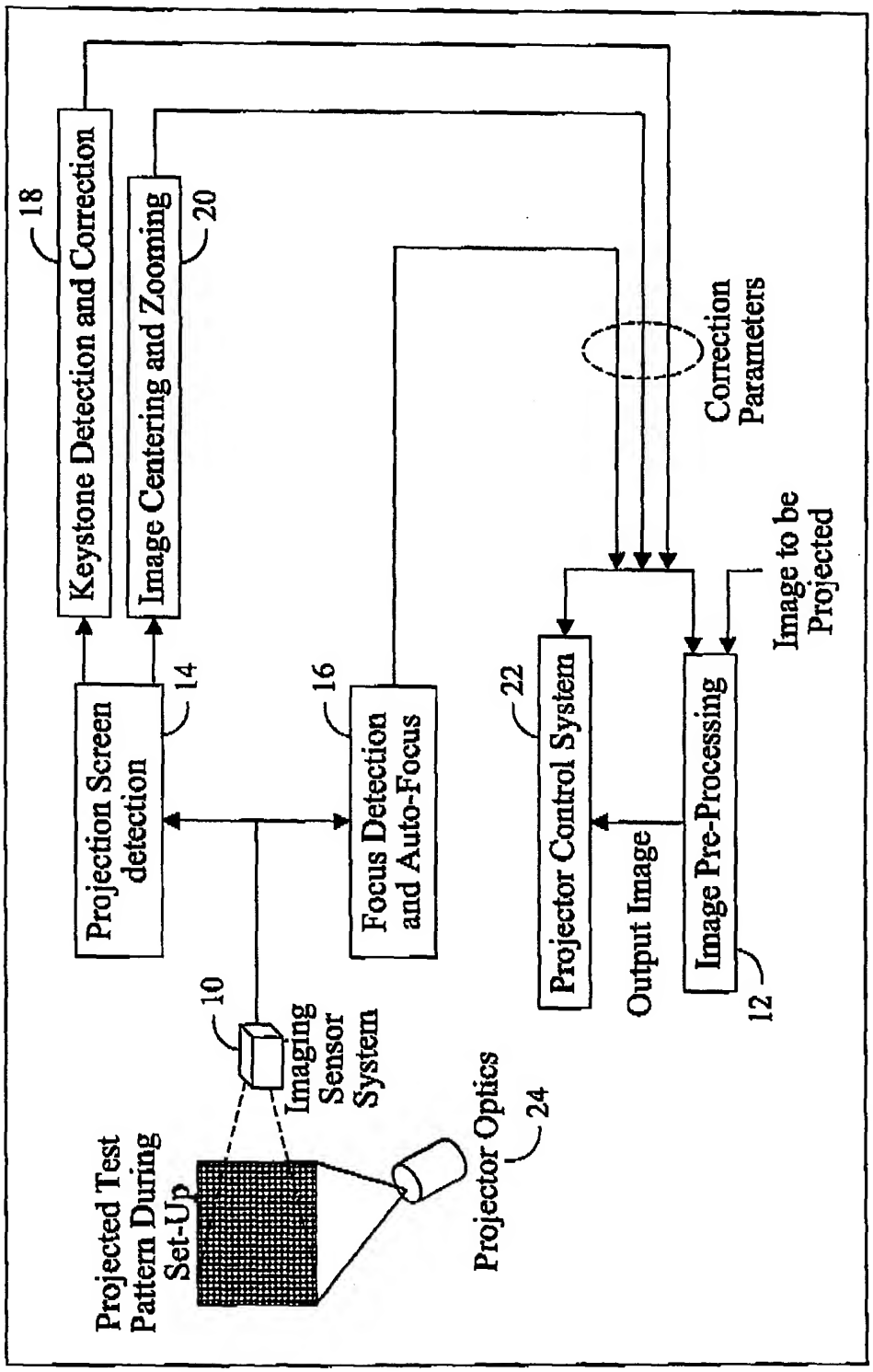

18
Keystone Detection and Correction
20
Image Centering and Zooming
Correction Parameters
Image to be Projected
14
Projection Screen detection
16
Focus Detection and Auto-Focus
22
Projector Control System
Output Image
Image Pre-Processing
12
10
Imaging Sensor System
Projected Test Pattern During Set-Up
Projector Optics
24

FIG. 3

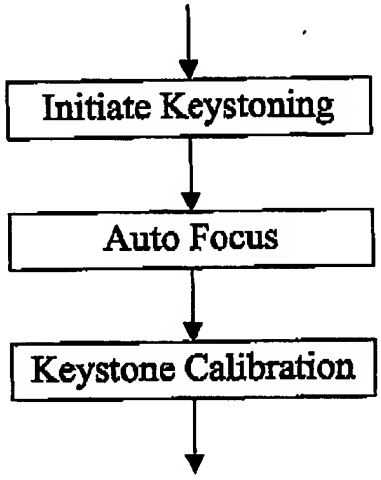
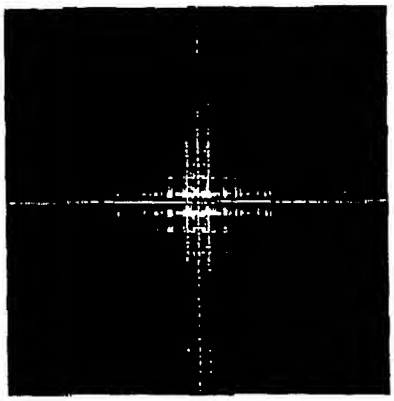


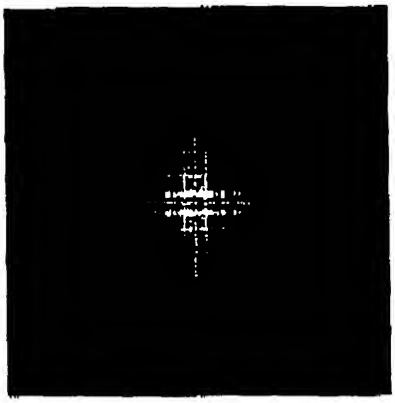
FIG. 4

FIG. 8



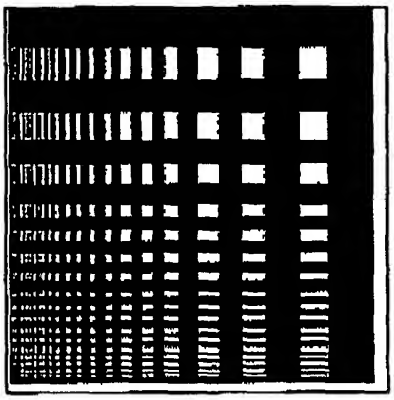
Spectrum

FIG. 7



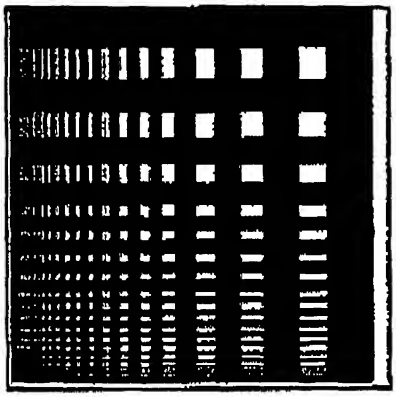
Spectrum

FIG. 5



Focused Image

FIG. 6



Out-of-focus Image

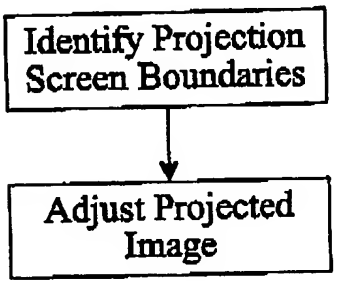

Identify Projection Screen Boundaries
Adjust Projected Image

FIG. 9

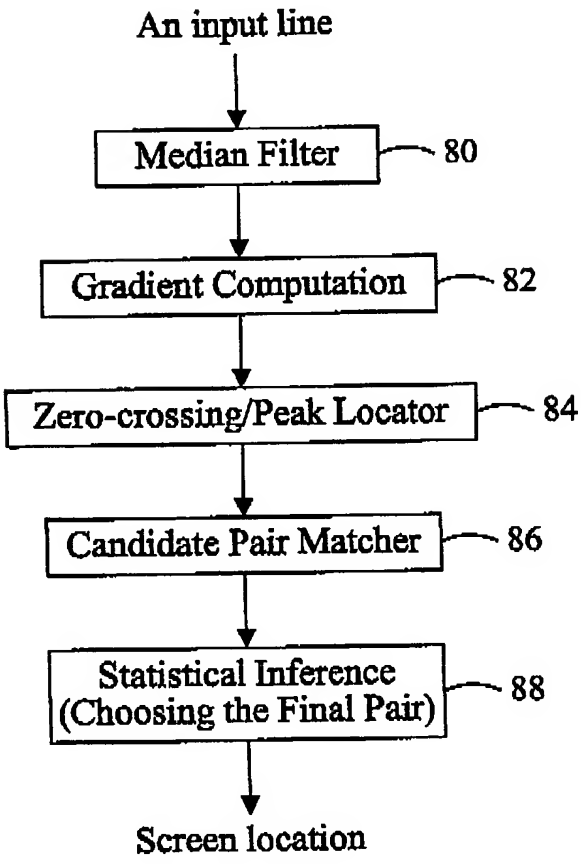
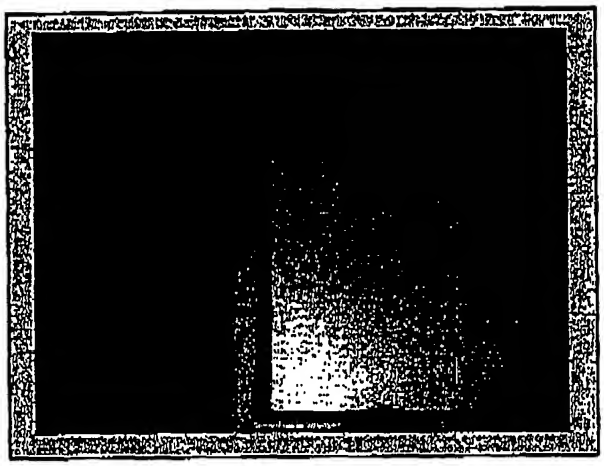

An input line
Median Filter
80
Gradient Computation
82
Zero-crossing/Peak Locator
84
Candidate Pair Matcher
86
Statistical Inference (Choosing the Final Pair)
88
Screen location

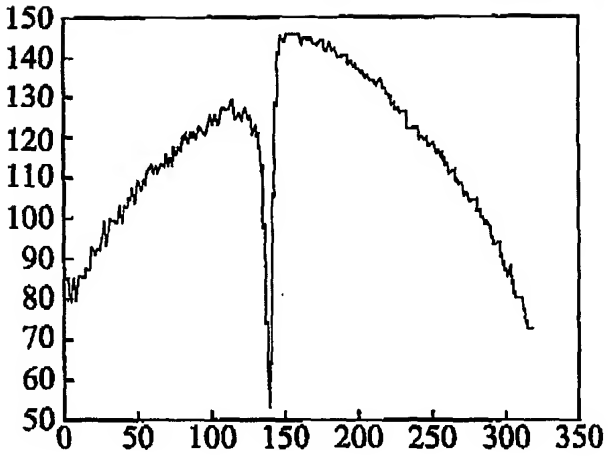
FIG. 10

(a)



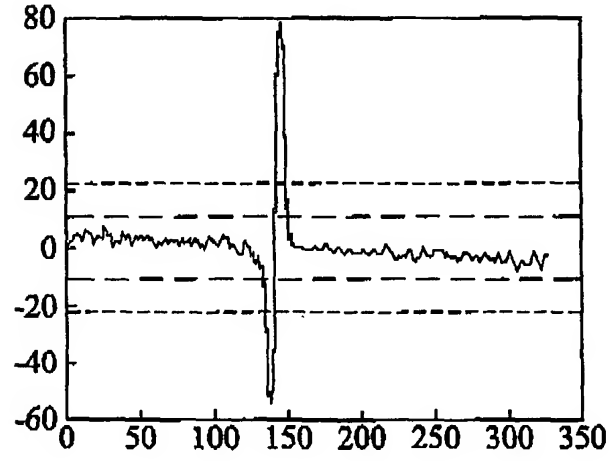
An image of the screen from the projector's perspective. The line is assumed to be the one row that the 1-D sensor can sense.

(b)



The luminance values of the row in (a), illustrating that working in the luminance domain there may be no region that is uniform (and thus is potential screen area).

(c)



The gradient of (b).

FIG. 11

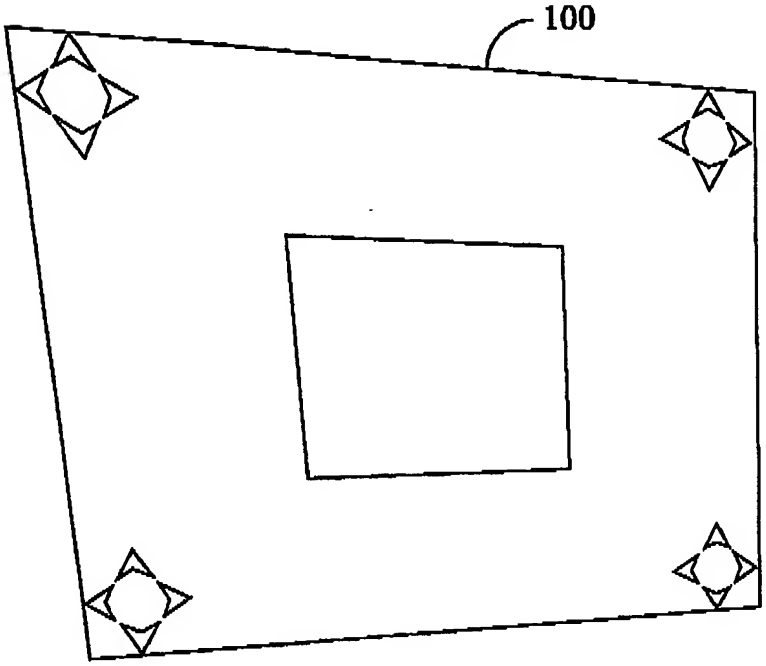


FIG. 12

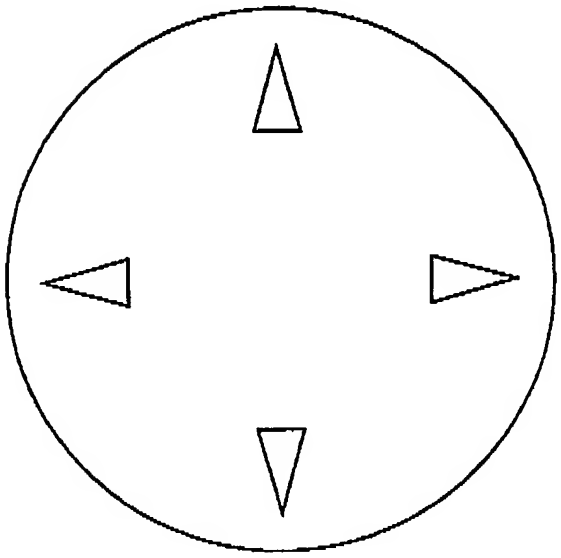
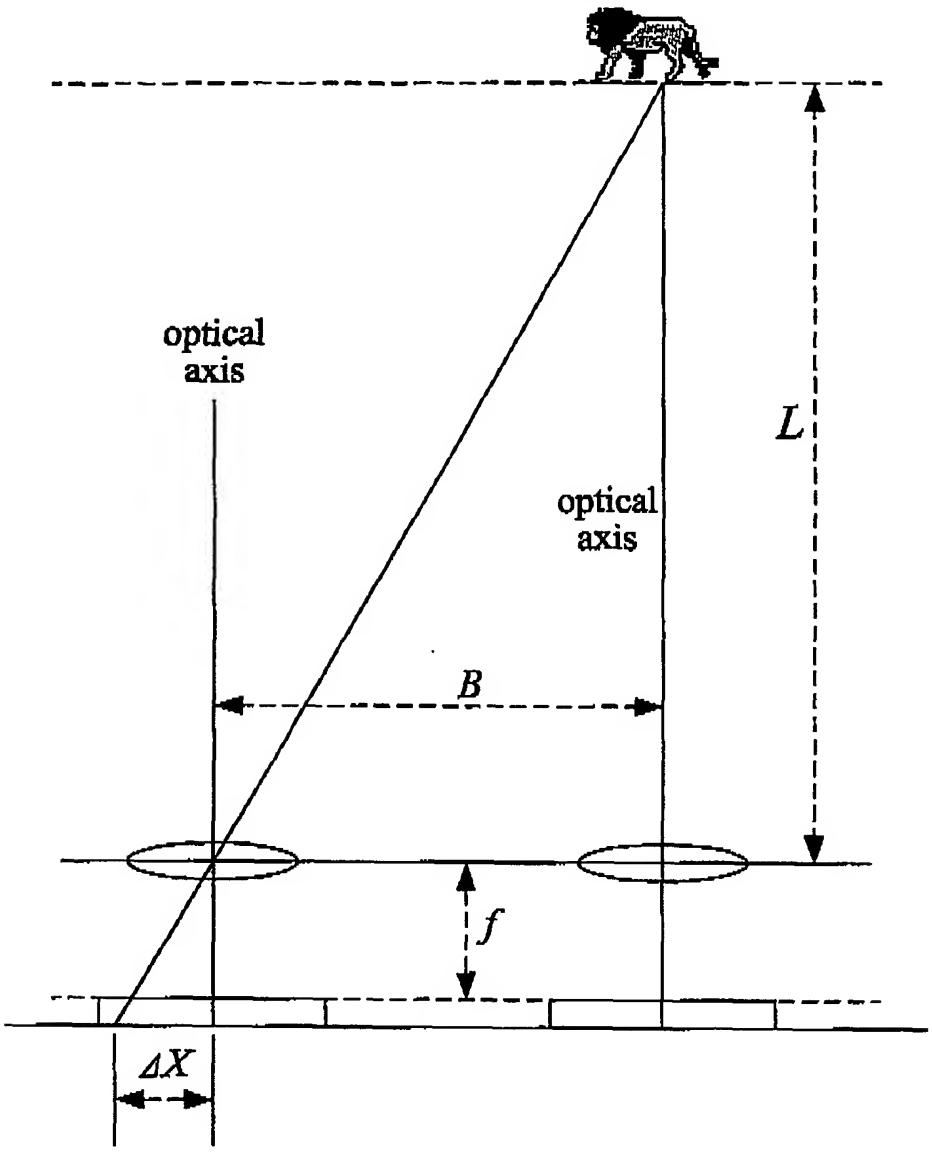


FIG. 13



Based on the similarity of the triangles, the distance L is computed as a function of the sensor parameters (B and f) and the disparity ΔX (difference between the two images of the same physical point):

$$L = \frac{Bf}{\Delta X}$$

FIG. 14

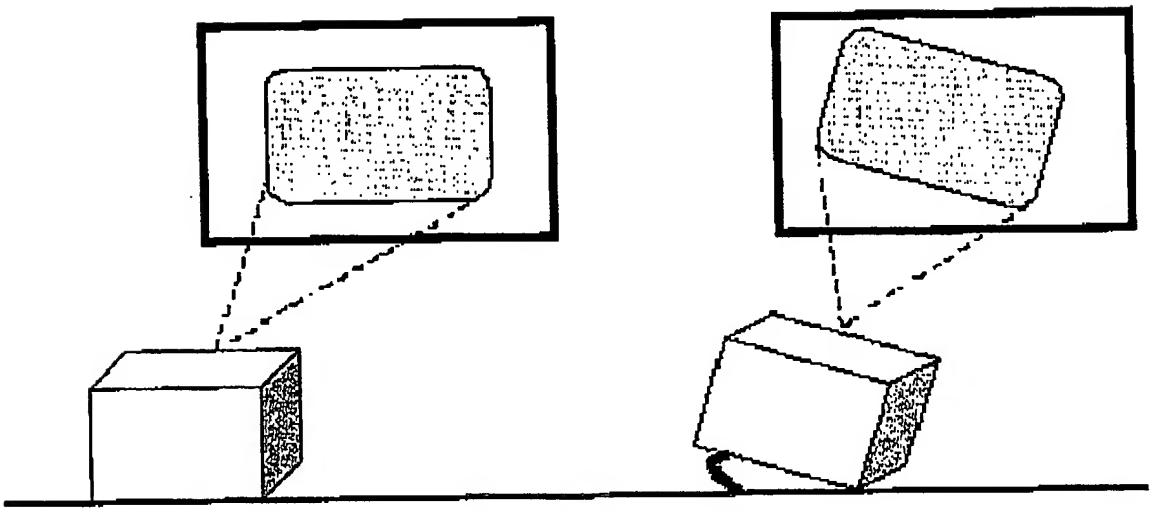


FIG. 16

FIG. 15